

Interactive comment on “Investigating possible changes of extreme annual rainfall in Zimbabwe” by D. Mazvimavi

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Evaluation of the overall quality of the discussion paper ("general comments"),

The stochastic nature of rainfall results in random occurrence of wet and dry periods. This implies that the average rainfall would largely depend on the rainfall patterns in the selected period of analysis. The author has not described the impact of local factors on rainfall occurrence and how this impacts on selection of stations for climate change monitoring.

Climate change effect could also be in the clustering of rain days, changes in duration of rainfall event, and intensity of rainfall during rainfall events (OBSERVED VARIABILITY AND TRENDS IN EXTREME CLIMATE EVENTS: A BRIEF REVIEW, D.R. Easterling,

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J.L. Evans, P. Ya. Groisman, T.R. Karl, K.E. Kunkel, P. Ambenje; Bulletin of the American Meteorological Society, 81, March 2000, 417-425). This supports author's arguments on p1769 lines 17 to 19.

The observations by Tyson on p1771 lines 16 to 20 have not been reviewed in terms of climate change impacts. The author could check conclusions with the longer data available using the moving average technique. Making climate change and variability conclusions over a broad area which is heterogeneous such as Zimbabwe can be misleading as the author correctly points out. Previous studies have tended to do this.

On p1772 lines 8 to 10 implies simultaneous occurrence change of rainfall patterns across observation station. This can be misleading as it ignores impact of local factors.

Not all rainfall station equipment and/or measurement procedures in Zimbabwe are adequate for climate change monitoring. This is also evident from the analysis conducted. The conclusions reached by the author are too strongly biased towards a 'no change' conclusion. In dealing with extreme rainfall events it is quite possible that only a few stations will show changes in trends. Some stations may be in areas which are climatically more sensitive than others and these are evaluable for climate change monitoring. Consider the equation for a parameter measurement system from Nyabeze (2002) (Nyabeze W. R., Determining parameter reliability levels in a digital information system for monitoring and managing hydrological droughts, Physics and chemistry of the Earth 27 (2002), 793-799) .. not publishable on HESS comment format. In the ideal case rate of change of measured value with respect to the signal should be a constant but in reality there is also a non-linear component. The environmental inputs fluctuate randomly with time if the constants are not zero. This causes of lack of repeatability. This non-sensitive station data suggests poor measurement of environmental components of rainfall. These stations may need upgrading in terms of instrumentation and procedures for measurement. The historical practice is inadequate. New rainfall gauges which are more sensitive can be installed at pilot sites to recalibrate old ones.

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Response to specific review questions: 1) Does the paper address relevant scientific questions within the scope of HESS? Yes 2) Does the paper present novel concepts, ideas, tools, or data? Yes, climate change and variability are currently very important research topics 3) Are substantial conclusions reached? Yes..but there other stronger arguments may be reached which can be of strategic value to Zimbabwe based on the same results… see reviewer’s comments. 4) Are the scientific methods and assumptions valid and clearly outlined? Yes 5) Are the results sufficient to support the interpretations and conclusions? Yes 6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes, however the author could also show graphs for stations where there are no increasing of decreasing trends. 7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes, see additional references in general comments section of this review 8) Does the title clearly reflect the contents of the paper? Yes 9) Does the abstract provide a concise and complete summary? Yes 10) Is the overall presentation well structured and clear? Yes 11) Is the language fluent and precise? Yes 12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes 13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes 14) Are the number and quality of references appropriate? Yes 15) Is the amount and quality of supplementary material appropriate? Yes

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1765, 2008.

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